

SUBMEPP



MS NO. 5310-081-069 REV B

SUBMARINE MAINTENANCE STANDARD

MR DESCRIPTION: Restore air ejector steam supply gate valve.

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Class: SSN688

SUBMEPP APPROVAL

T. C. Chan

SYSTEM/COMPONENT ENGINEER/TECHNICIAN

Scott E. Mercer

4/20/01

PROGRAM MANAGER

DATE



REVISIONS/CHANGES		
REV	DESCRIPTION	SUBMEPP APPROVAL & DATE
-	Original issue was developed to cover, in part, maintenance previously covered by TRS No. 4820-086-038 for SSN688 Class.	B. W. Young Eric E. Blough 9/18/98
A	The MS was revised to: 1. Incorporate TRK UACS 2084A-98 (added reference to cleanliness requirements manual, NAVSEA 0986-064-3000).	B. W. Young Eric E. Blough 3/19/99
B	The MS was revised to: 1. Incorporate SUBMEPP comments (enhanced MS to support SHAPEC initiatives).	T. C. Chan Scott E. Mercer 4/20/01
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MAINTENANCE STANDARD

EQUIPMENT/COMPONENT	MS NO. 5310-081-069
Air Ejector Steam Supply Gate Valve	
SYSTEM	RELATED MAINTENANCE
Steam Distilling Plants	None

MR DESCRIPTION

1. Restore air ejector steam supply gate valve.

ATTACHMENTS

1. Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements
2. Equipment Guide List/Maintenance Requirement Parts List
3. Applicable Steps of General Acceptance Criteria (GAC)

TECHNICAL REFERENCE DATA

- | | |
|---|--------------------------------|
| (a) 1/2" - 600# Carbon Steel O.S.&Y. Gate Valve with Renew.
Seats and S.W. Ends | Wm. Powell Co. Drawing C-65266 |
| (b) Steam Plant Cleanliness Control | NAVSEA INST 9210.36 |
| (c) Cleanliness Requirements for Nuclear Propulsion Plant
Maintenance by Forces Afloat | NAVSEA 0986-064-3000 |

SAFETY PRECAUTIONS

1. Observe standard safety precautions.
2. Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 258 psig maximum.
3. Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 185 psig maximum.

BOUNDARIES

1. Boundary of this MS IS the entire valve as depicted on Figure 1.

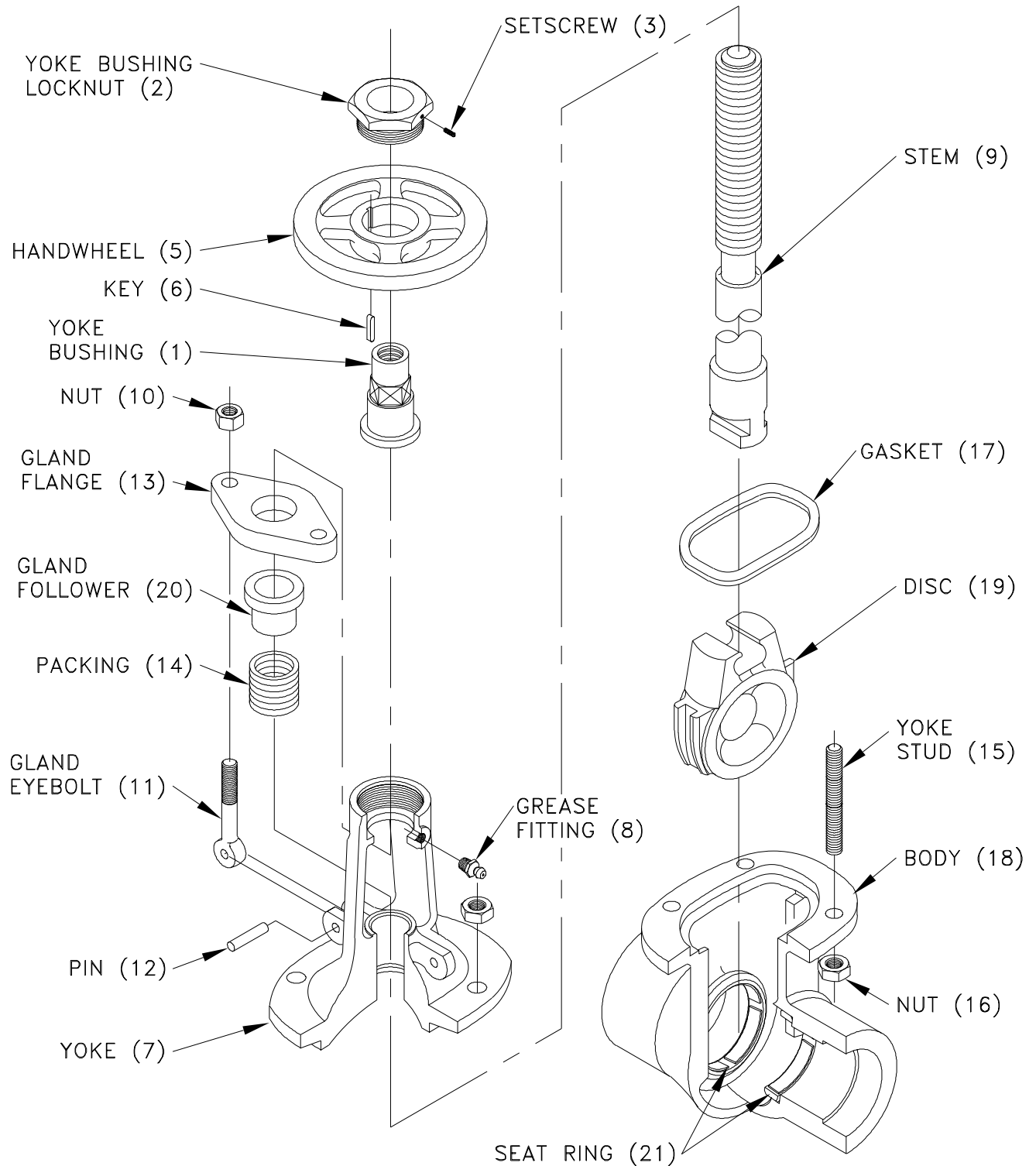


Figure 1. Air Ejector Steam Supply Gate Valve

PROCEDURE

Preliminary

NOTE 1: In instances where design criteria (e.g., surface finishes, tolerances, etc.) conflict with the criteria of this MS, the criteria of this MS must govern.

- a. Ensure air ejector steam supply gate valve has been isolated, depressurized, and tagged out in accordance with Type Commander's instructions.

1. Restore air ejector steam supply gate valve.

NOTE 2: All parts identified as M (mandatory) in the Maintenance Requirement Parts List must be replaced. Other parts that do not meet the acceptance criteria, as defined herein, may be either repaired to original design requirements, in accordance with approved procedures, or replaced, whichever is more economical. A clarification of the above requirement is that metal removal is allowed to bring unacceptable surface defects within the acceptable limits of this MS, provided the metal removal does not cause any dimensional or geometric requirements of this MS (or the original design, where the MS is silent) to be violated.

NOTE 3: Prior to disassembly, refer to Instructions for Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements in Attachment 1.

1.a. Disassemble valve using Reference (a), Figure 1, and the following instructions as guides:

1.a.(1) Unscrew yoke bolt nuts, piece 16, and remove yoke studs, piece 15.

1.a.(2) Remove yoke assembly with stem, piece 9, and disc, piece 19.

1.a.(3) Remove disc, piece 19, from stem, piece 9.

1.a.(4) Remove yoke gasket, piece 17, from body, piece 18.

NOTE 4: Seat rings, piece 21, may be lapped in place provided they have not deteriorated and sufficient metal remains for lapping.

1.a.(5) Loosen gland flange eyebolt nuts, piece 10, which will loosen gland packing, piece 14, and facilitate stem removal. Unscrew stem, piece 9, from yoke bushing, piece 1, and remove it from yoke, piece 7.

1.a.(6) Unscrew gland eyebolt nuts, piece 10, and remove gland flange, piece 13.

1.a.(7) Remove gland follower, piece 20, and packing, piece 14, from the stuffing box.

1.a.(8) Loosen setscrew, piece 3, in yoke bushing locknut, piece 2, and unscrew the locknut from yoke bushing, piece 1. Remove handwheel, piece 5, and key, piece 6.

1.a.(9) Drive out eyebolt pin, piece 12, from the ear-like projection on yoke, piece 7, and remove gland eyebolts, piece 11, from the yoke.

PROCEDURE (Cont'd)

1.a.(10) Grind loose the seal welds which lock the seat rings, piece 21, and unscrew seat rings, piece 21, from body, piece 18.

1.a.(11) Remove grease fitting, piece 8, from yoke, piece 7.

1.b. Clean all parts to the extent that no foreign material is visible; maintain cleanliness in accordance with Reference (b) or Reference (c), as applicable.

NOTE 5: Unless otherwise specified, surface finish and the size and spacing of surface defects may be estimated visually.

NOTE 6: Unless otherwise specified, rhr surface finish requirements apply only to surfaces surrounding acceptable defects and not to the defect areas themselves. Sharp or raised edges on acceptable defects are not acceptable.

NOTE 7: Piece numbers are from Attachment 2.

NOTE 8: Line of contact is defined as the area of contact between the sealing faces of the disk, piece 19, and seat ring, piece 21, obtained from blue check impression method inspection performed in accordance with a NAVSEA-approved procedure.

1.c. Determine the line of contact between disk, piece 19, and seat ring, piece 21:

1.c.(1) Line width must not be less than 1/16".

1.c.(2) Line must extend 360 degrees around sealing faces.

1.c.(3) Line must be defect free.

NOTE 9: Line of contact is defined as the area of contact between the sealing faces of the stem, piece 9, and yoke, piece 7, obtained from blue check impression method inspection performed in accordance with a NAVSEA-approved procedure.

1.d. Determine the line of contact between stem, piece 9, and yoke, piece 7:

1.d.(1) Backseat line width must not be less than 1/64" and must not be more than 1/32".

1.d.(2) Backseat line must extend 360 degrees around sealing faces.

1.d.(3) Backseat line must be defect free.

1.e. Inspect disk, piece 19:

1.e.(1) Mating machined surfaces must be free of nicks, burrs, and high spots.

1.e.(2) Surfaces mating with seat rings, piece 21, finish must be rhr 32 or smoother.

PROCEDURE (Cont'd)

- 1.e.(3) Sealing faces surface defects within 1/8" of line of contact, determined in Step 1.c., must not exceed 1/16" in length or width, 3/64" in depth, and defect spacing must not be less than 1/8"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

NOTE 10: If metal is removed from sealing faces, an equal amount must be removed from both sealing faces on disk, piece 19.

- 1.e.(4) Metal removal from backseat surfaces must not exceed 0.032" or allow the disk to bottom out in valve. Seating angle must meet the requirements of Reference (a).
- 1.e.(5) Surface defects on remaining surfaces must not exceed 0.050" in depth or cover more than 20 percent of the total surface area.

1.f. Inspect gland follower, piece 20:

- 1.f.(1) Machined surfaces must be free of nicks, burrs, and high spots.
- 1.f.(2) Surface in way of packing, piece 14, surface defects must not exceed 0.015" in width, 0.010" in depth, or cover more than 20 percent of the surface area. Metal removal must not exceed 0.005" below minimum dimensions specified in Reference (a).
- 1.f.(3) Surface finish must be rhr 125 or smoother.

1.g. Inspect body, piece 18:

PROCEDURE (Cont'd)

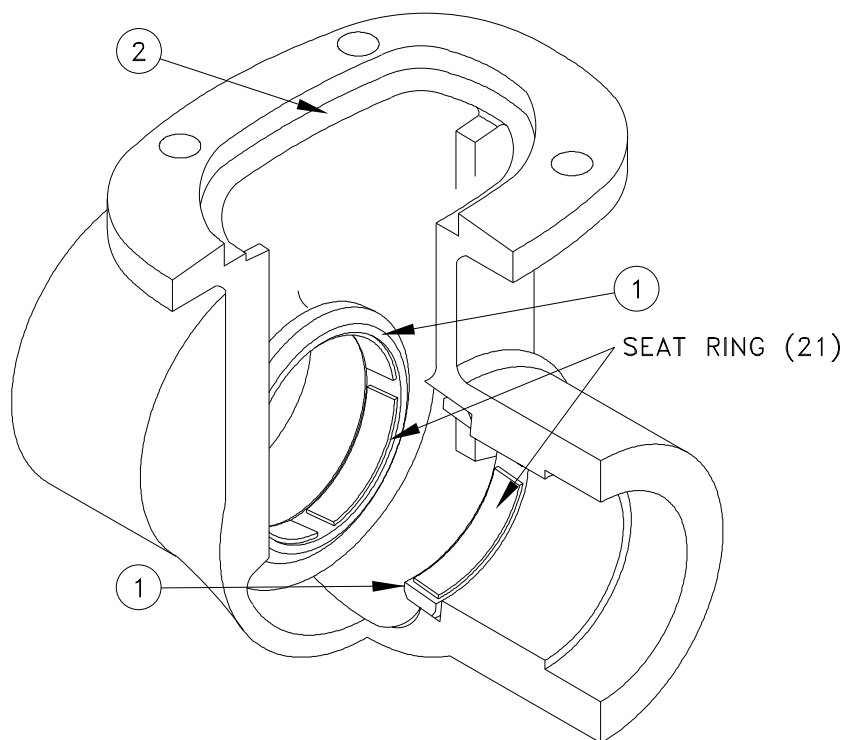


Figure 2. Body

1.g.(1) Visible cracks are not acceptable.

1.g.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.

NOTE 11: Removal of seat ring, piece 21, solely to perform inspections of Step 1.g.(3) is not required.

1.g.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(2).

1.g.(4) Wall thickness must meet the requirements of Attachment 3 Step 1.g.(3).

1.g.(5) Inspect seat ring, piece 21:

1.g.(5)(a) Sealing faces [1] surface defects within 1/8" of line of contact, determined in Step 1.c., must not exceed 1/16" in length or width, 3/64" in depth, and defect spacing must not be less than 1/8"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

NOTE 12: If metal is removed from sealing faces, an equal amount must be removed from both sealing faces of seat ring, piece 21.

1.g.(5)(b) Metal removed from backseat surfaces must not exceed 0.032", or allow the disk to bottom out in valve. Seating angle must meet the requirements of Reference (a).

1.g.(5)(c) Surfaces [1] finish must be rhr 32 or smoother.

PROCEDURE (Cont'd)

- 1.g.(5)(d) Surface defects on remaining surfaces must not exceed 0.050" in depth or cover more than 20 percent of the total surface area.
- 1.g.(5)(e) Seat rings must be firmly seated in body; loose seat rings are not acceptable.
- 1.g.(6) Surface [2] must meet the requirements of Attachment 3 Step 1.b.(2), except defect depth must not exceed 1/32".
- 1.h. Inspect stem, piece 9:

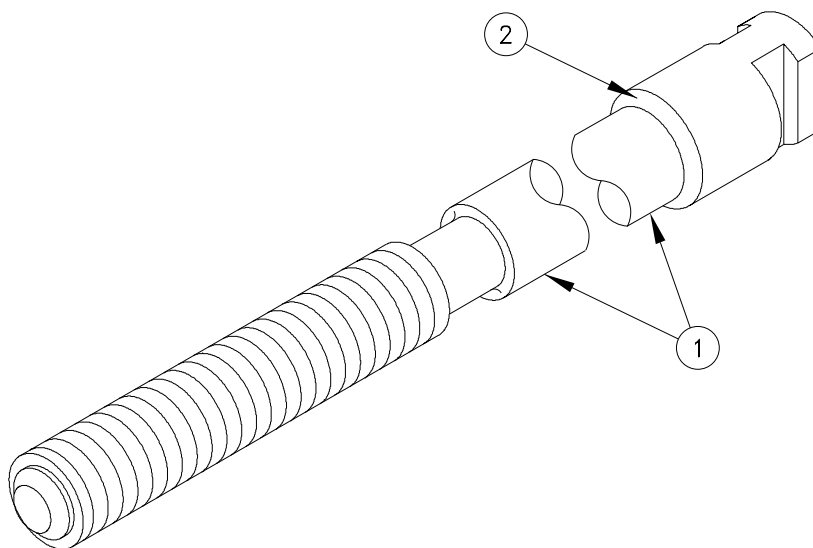


Figure 3. Stem

- 1.h.(1) Visible cracks or bends are not acceptable.
- 1.h.(2) Machined surface [1] and backseat surface [2] finish must be rhr 63 or smoother.
- 1.h.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
- 1.h.(4) Sealing surface [1], in way of packing, piece 14, surface defects must not exceed 0.010" in width or 0.005" in depth. Defect spacing must not be less than 1/32". Average defect spacing must not be less than 1/8".
- 1.h.(5) Non-sealing surface [1] surface defects must not exceed 0.015" in width, 0.010" in depth, or cover more than 20 percent of the surface area. Sharp edges on allowable defects are not acceptable.
- 1.h.(6) Sealing face [2], surface defects within 1/8" of line of contact, determined in Step 1.d., must not exceed 1/32" in length, width, or depth, and defect spacing must not be less than 1/16"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

PROCEDURE (Cont'd)

1.h.(7) Stem must move freely in assembled valve (without packing, piece 14) without sticking or binding, using hand force only; protruding end must reveal little or no runout.

1.h.(8) Diameter [1] must not be less than 0.479".

1.i. Inspect yoke, piece 7:

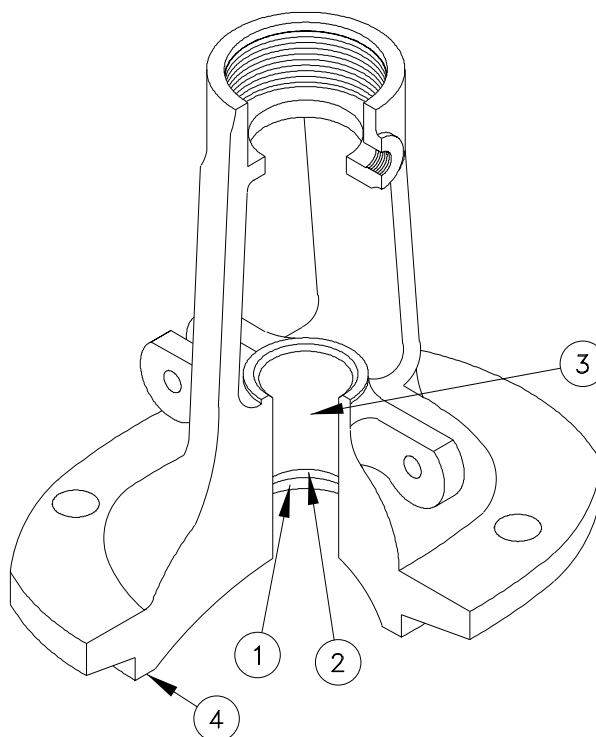


Figure 4. Yoke

1.i.(1) Visible cracks or bends are not acceptable.

1.i.(2) Machined surfaces [1] and [2] finish must be rhr 32 or smoother.

1.i.(3) Yoke backseat:

1.i.(3)(a) Seating face [1] surface defects within 1/8" of line of contact, determined in Step 1.d., must not exceed 1/32" in length, width, or depth, and defect spacing must not be less than 1/16"; surface defects outside 1/8" of line of contact must not exceed 3/32" in length or width, 1/16" in depth, and defect spacing must not be less than 5/32".

1.i.(3)(b) Metal removal must not exceed 0.032"; backseat angle must meet the requirements of Reference (a). Sharp edges on allowable defects are not acceptable.

1.i.(4) Sealing surfaces [3], in way of packing, piece 14, surface defects must not exceed 0.015" in width or 0.010" in depth. Defect spacing must not be less than 3/16". Surface finish must be rhr 125 or smoother.

PROCEDURE (Cont'd)

- 1.i.(5) Packing cavity diameter must not exceed 0.828".
- 1.i.(6) Wall thickness must meet the requirements of Attachment 3 Step 1.g.(5).
- 1.i.(7) Flat gasket sealing surface [4] must meet the requirements of Attachment 3 Step 1.c.(1).
- 1.j. Inspect gland flange, piece 13:
 - 1.j.(1) Visible cracks are not acceptable.
 - 1.j.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.
- 1.k. Inspect handwheel, piece 5:
 - 1.k.(1) Visible cracks are not acceptable.
 - 1.k.(2) Ineffective wrench flats are not acceptable.
- 1.l. Inspect grease fitting, piece 8:
 - 1.l.(1) Visible cracks are not acceptable.
 - 1.l.(2) Grease passage must be clean and unobstructed.
 - 1.l.(3) Spring loaded ball must seat firmly and not leak.
 - 1.l.(4) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
 - 1.l.(5) Ineffective wrench flats are not acceptable.
- 1.m. Inspect yoke stud, piece 15, yoke stud nut, piece 16, and yoke bushing locknut, piece 2:
 - 1.m.(1) Visible cracks are not acceptable.
 - 1.m.(2) Threads must meet the requirements of Attachment 3 Step 1.e.(2).
 - 1.m.(3) Ineffective wrench flats are not acceptable.

NOTE 13: Removal of gland eyebolt, piece 11, solely to perform inspections of Step 1.n.(1) through Step 1.n.(4) is not required.

- 1.n. Inspect gland eyebolt, piece 11, gland eyebolt nut, piece 10, and gland eyebolt pin, piece 12:
 - 1.n.(1) Visible cracks are not acceptable.
 - 1.n.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.
 - 1.n.(3) Threads must meet the requirements of Attachment 3 Step 1.e.(1).

PROCEDURE (Cont'd)

1.n.(4) Ineffective wrench flats are not acceptable.

1.o. Inspect yoke bushing, piece 1:

1.o.(1) Visible cracks are not acceptable.

1.o.(2) Mating machined surfaces must be free of nicks, burrs, and high spots.

1.o.(3) Grease passages must be clean and unobstructed.

1.o.(4) Threads must meet the requirements of Attachment 3 Step 1.e.(2).

1.p. Reassembly:

1.p.(1) Use M (mandatory) replacement parts identified in the Maintenance Requirement Parts List.

1.p.(2) Verify, using blue check method, 100 percent line of contact between disk, piece 19, and seat rings, piece 21, seating surfaces.

1.p.(3) Reassemble valve using Reference (a), Figure 1, and the following instructions as guides:

1.p.(3)(a) Install seat rings, piece 21, into valve body, piece 18, if removed during disassembly. Seal weld the seat rings.

1.p.(3)(b) Reinstall the gland eyebolts, piece 11, onto valve yoke, piece 7, if removed during reassembly.

1.p.(3)(c) Install stem, piece 9, up through yoke, piece 7. Install packing, piece 14, gland follower, piece 20, and gland flange, piece 13. Install nuts, piece 10, on the gland eyebolts.

1.p.(3)(d) Thread the yoke bushing, piece 1, onto the stem and into yoke. Install key, piece 6, in yoke bushing keyway and install handwheel. Reinstall yoke bushing locknut, piece 2, and setscrew, piece 3.

1.p.(3)(e) Install gasket, piece 17, on gasket seating surface of valve body, piece 18.

1.p.(3)(f) Connect the disc, piece 19, to the stem and install the assembly into valve body. Install studs, piece 15, and nuts, piece 16. Make up joint evenly by sequentially tightening each nut in increments until the gap reaches $0.100'' \pm 0.005''$. To the maximum extent possible, maintain flange faces parallel during the tightening sequence.

1.q. Hydrostatic test:

NOTE 14: If test medium used is other than system fluid or equal, flush in accordance with Reference (b) or Reference (c), as applicable.

NOTE 15: When major repairs (as defined by CINCLANTFLT/CINCPACFLT INST 4790.3, Volume V) have been accomplished, perform Step 1.q.(1). When minor repairs (as defined by CINCLANTFLT/CINCPACFLT INST 4790.3, Volume V) have been accomplished, omit Step 1.q.(1).

PROCEDURE (Cont'd)

1.q.(1) Strength and porosity test (major repair/H-pressure):

NOTE 16: Observation of water or wetting at fluid boundary at the stem packing does not constitute leakage unless droplets form which flow away from point of origin within 5 minutes of formation.

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 258 psig maximum.

1.q.(1)(a) With valve in half-open position, pressurize valve to 230 (230 to 235) psig, using fresh water as a test medium; maintain test pressure for at least 30 minutes plus sufficient time to inspect for leakage.

1.q.(1)(b) Inspect for external leakage, weeping through pressure-containing parts, and permanent deformation; external leakage, weeping through pressure-containing parts (except at packing; see Note 16), or permanent deformation is not acceptable.

1.q.(2) Mechanical joint tightness test (minor repair/J-pressure):

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 185 psig maximum.

1.q.(2)(a) With valve in half-open position, pressurize valve to 165 (165 to 168) psig, using fresh water as a test medium; maintain test pressure for at least 3 minutes plus sufficient time to inspect for leakage.

1.q.(2)(b) Inspect for external leakage; external leakage is not acceptable (except at packing; see Note 16).

1.q.(3) Seat tightness test:

1.q.(3)(a) Cycle valve.

WARNING: Equip hydrostatic test pump with a certified test gage and relief valve. Set relief valve at 185 psig maximum.

1.q.(3)(b) With valve shut, pressurize valve to 165 (165 to 168) psig, using fresh water as a test medium; maintain test pressure for at least 3 minutes plus sufficient time to inspect for leakage. If there is any visible seat leakage, continue the test for a sufficient length of time to accurately determine the rate of leakage. Test to be conducted on both sides.

1.q.(3)(c) Inspect for seat leakage; seat leakage must not exceed 10 cc per hour.

1.r. Operational test:

1.r.(1) Cycle valve; valve must operate without sticking or binding.

1.r.(2) Valve indication must agree with valve position.

PROCEDURE (Cont'd)

- 1.s. Ensure tags are cleared in accordance with Type Commander's instructions.

Globe/Gate/Swing Check Valve Material Condition Feedback (MCF) Requirements

Instructions

- (1) Observe the general condition of all parts during disassembly for extreme area of wear or deterioration, breakage, or unusual conditions which might affect performance.
- (2) Observations are to be performed prior to scrapping parts (if they are to be replaced) and prior to performing any work or mechanical cleaning which would modify the "as-disassembled" condition.
- (3) Record specific piece/part condition(s) and related failure mechanisms (e.g., bent, cracked, scored, corroded, or eroded, etc.).
- (4) Record in the "Other" section of the Material Condition Feedback Form any unsatisfactory findings that were not specifically inspected for in the Maintenance Standard.
- (5) The Material Condition section of Attachment 1 must be completed, however, to reduce paperwork, you are encouraged to attach copies of work center or shop produced forms and records in lieu of completing the applicable sections of Attachment 1 (e.g., TGI, Mechanical Component Record, Shop Test Record, etc.), provided they meet the requirements of "as-found condition" and/or "corrective action" information.

MATERIAL CONDITION FEEDBACK (MCF) REQUIREMENTS FOR GLOBE/GATE/SWING CHECK VALVES	SEND INFORMATION TO SHIPYARD SMPC (VIA WORK PACKAGING)	OR MAIL TO 	COMMANDING OFFICER SUBMEPP CODE 1810 P.O. BOX 7002 PORTSMOUTH NH 03802-7002		
HULL: _____ AVAIL (SRA, Refit #): _____ COMPONENT: _____ Ser.# (TRIPER/AERP): _____		SWLIN/SSI: _____ SWLIN PARA#/MRN: _____ Job Order (JCN, TGI): _____ FGC/HSC: _____			
COMPONENT CONDITION ASSESSMENT					
Was component in operating condition prior to restoration? ____ Yes ____ No ____ Unknown		If No, please provide reason.			
Inspection Criteria: =====>>	1. Meets MS criteria with no or light handworking required. 2. Machining required to meet MS criteria. 3. Material build-up required (e.g., weld, epoxy coat, electroplating) to meet MS criteria. 4. Part replacement required.				
Inspection Area:	1	2	3	4	Failure Mode Evidence and Comments:
<u>Seat sealing area:</u> body/sealring					
<u>Stem bearing area:</u> body bonnet stem					Is there any evidence of binding (e.g., galling)? ____ Yes (explain) ____ No
<u>Stem sealing area:</u> body bonnet stem					Is there any evidence of leakage past the seal? ____ Yes (explain) ____ No
<u>Disk/Gate:</u> seat sealing area					
<u>Body cavity:</u> wall thickness (when req'd by MS)					
Other: (Supplemental comments on condition or work done to this component, e.g., entire component or unit replaced, changes to mandatory/contingency parts)					
_____ _____ _____ _____					
(Attach additional sheet/information if needed)				_____ Mechanic/Point of Contact	
				_____ Date	

Equipment Guide List and Maintenance Requirement Parts List

EQUIPMENT GUIDE LIST					
IDENTIFICATION NO.					APL
SD-139					882047729
MAINTENANCE REQUIREMENT PARTS LIST					
DRAWING NO. Wm. Powell Co. dwg C-65266 Rev H					
DESCRIPTION	PIECE NO.	QTY	CAGE	PART NO.	*M/C/S
Packing	14	1 set	48422	02620	M
Gasket	17	1	48422	07742	M
Yoke bushing	1	1	48422	60813	C
Yoke bushing locknut	2	1	48422	26453	C
Handwheel	5	1	48422	26348	C
Yoke	7	1	48422	60815	C
Grease fitting	8	1	48422	60499	C
Stem	9	1	48422	24634	C
Gland eyebolt nut	10	2	48422	24831	C
Gland eyebolt	11	2	48422	24934	C
Gland eyebolt pin	12	2	48422	25280	C
Gland flange	13	1	48422	47014	C
Yoke stud	15	4	48422	58161	C
Yoke nut	16	8	48422	19692	C
Body	18	1	48422	65364	C
* Mandatory/Contingency/Special Tool					

MAINTENANCE REQUIREMENT PARTS LIST (Cont'd)					
DRAWING NO. Wm. Powell Co. dwg C-65266 Rev H (Cont'd)					
DESCRIPTION	PIECE NO.	QTY	CAGE	PART NO.	*M/C/S
Disc	19	1	48422	39740	C
Gland follower	20	1	48422	47020	C
Seat ring	21	2	48422	36407	C
* Mandatory/Contingency/Special Tool					

Applicable Steps of General Acceptance Criteria (GAC)

NOTE: This attachment contains only those steps from MS No. 7650-081-001G, General Acceptance Criteria, that are necessary to accomplish the inspections required by this MS.

1. General acceptance criteria

1.b. Flange thickness:

Figure 5. Flange Thickness

- NOTE 11: Flange thickness [1] is defined as the thickness from the finished machined face [2] to the back machined spotface [3], Figure 5 - left, or the thickness from the finished machined face [2] to the as-cast/as-forged back face [4], Figure 5 - right.
- NOTE 12: For non-hull flanges, thickness measurements are not required on flanges where visual inspection verifies no erosion or corrosion.
- NOTE 13: If drawing minimum flange thickness is less than the minimum specified in this section, drawing minimum applies.
- NOTE 14: For non-hull flanges, the minimum average thickness, Table 5 - column C, is determined by averaging 5 spotface thickness measurements, some of which may be below the minimum thickness, Table 5 - column B. If front face [2] to spotface [3] dimension [1], Figure 5 - left, meets or exceeds the minimum thickness, Table 5 - column B, it will be obvious that the minimum average dimensions are acceptable without an arithmetic determination of the average.
- NOTE 15: For flanges with raised faces, refer to Step 1.b.(5).
- NOTE 16: Since reduction of flange thickness may affect fit-up/alignment requirements, an engineering judgement must be obtained before performing Step 1.b.(1)(b) or Step 1.b.(2)(a) unless the equipment or component MS specifically allows the reduction.

1.b.(2) Flat gasket flanges:

- 1.b.(2)(a) Material may be removed from the front face [2] to meet sealing surface requirements of Step 1.c. providing flange thickness [1] is not reduced to less than the value or values specified in Table 5. On flanges where gasket compression is determined by a space remaining after metal-to-metal contact, the gasket space must meet drawing requirements.

NOTE 17: Table 5, columns A, B, and C, identifies hull flange minimum and non-hull flange minimum and average minimum acceptable thicknesses, respectively, for common sizes of flanges. For nominal flange thicknesses not listed in Table 5, the following acceptance criteria apply.

Table 5. Minimum Acceptable Flange Thickness							
Nominal Flange Thickness (Note 11 and Note 15)	Hull Flanges	Non-Hull Flanges		Nominal Flange Thickness (Note 11 and Note 15)	Hull Flanges	Non-Hull Flanges	
	A Minimum (Note 13)	B Minimum (Note 13)	C Min Avg* (Note 14)		A Minimum (Note 13)	B Minimum (Note 13)	C Min Avg* (Note 14)
1/8	0.113	0.113	0.119	1-5/8	1.593	1.503	1.564
1/4	0.235	0.225	0.238	1-11/16	1.656	1.561	1.624
5/16	0.298	0.281	0.297	1-3/4	1.718	1.619	1.684
3/8	0.360	0.338	0.356	1-13/16	1.781	1.677	1.745
7/16	0.423	0.394	0.416	1-7/8	1.844	1.734	1.804
1/2	0.485	0.450	0.475	1-15/16	1.906	1.792	1.865
9/16	0.548	0.506	0.534	2	1.969	1.850	1.925
5/8	0.610	0.563	0.594	2-1/8	2.062	1.975	2.050
11/16	0.673	0.619	0.653	2-3/16	2.125	2.038	2.113
3/4	0.735	0.675	0.713	2-1/4	2.187	2.100	2.175
13/16	0.798	0.731	0.772	2-3/8	2.312	2.225	2.300
7/8	0.860	0.788	0.831	2-1/2	2.437	2.350	2.425
15/16	0.923	0.844	0.891	2-5/8	2.562	2.475	2.550
1	0.985	0.900	0.950	2-3/4	2.687	2.600	2.675
1-1/16	1.031	0.963	1.013	2-7/8	2.812	2.725	2.800
1-1/8	1.093	1.025	1.075	3	2.937	2.850	2.925
1-3/16	1.156	1.088	1.138	3-1/8	3.062	2.969	3.047
1-1/4	1.218	1.150	1.200	3-1/4	3.187	3.088	3.169
1-5/16	1.281	1.213	1.263	3-3/8	3.312	3.206	3.291
1-3/8	1.343	1.272	1.323	3-1/2	3.437	3.325	3.413
1-7/16	1.406	1.330	1.384	3-5/8	3.562	3.444	3.534
1-1/2	1.468	1.388	1.444	3-3/4	3.687	3.563	3.656
1-9/16	1.531	1.445	1.504	4	3.937	3.800	3.900
All dimensions are in inches.							
* A minimum of 5 measurements is necessary to arithmetically determine average thickness.							

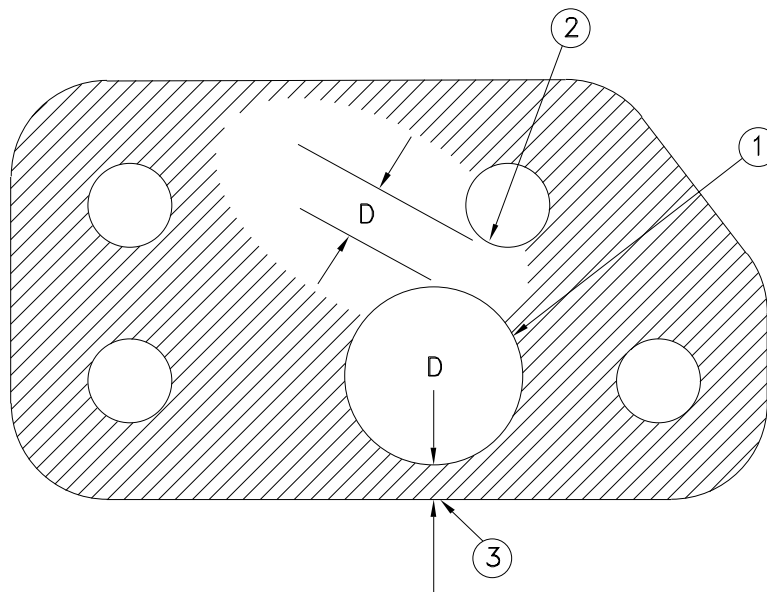
1.c. Flat gasket sealing surfaces:

Figure 6. Flat Gasket Sealing Surfaces

- NOTE 18: D is the distance from inner edge of gasket [1] to inner edge of closest gasket bolt hole [2], or the distance from inner edge of gasket [1] to closest outside edge of gasket [3], whichever is less. For gaskets without bolt holes, D is the distance from inner edge of gasket [1] to closest outside edge of gasket [3].
- NOTE 19: Unless otherwise specified, surface finish and the size and spacing of surface defects may be estimated visually.
- NOTE 20: Unless otherwise specified, rhr surface finish requirements apply only to surfaces surrounding acceptable defects and not to the defect areas themselves. Sharp or raised edges on acceptable defects are not acceptable.
- NOTE 21: Lay is defined as the direction of the predominant surface pattern caused by the machining operation.

1.c.(1) Sealing surfaces machined with straight lay (see Note 18 through Note 21):

- 1.c.(1)(a) Any surface defect or series of surface defects which, if connected, would form a leakage path to any gasket bolt hole [2] or any outer gasket edge [3] is acceptable provided normal gasket contact greater than one half of D exists along that path.
- 1.c.(1)(b) Raised or sharp edges of acceptable surface defects on gasket contact surface are not acceptable.

- 1.c.(1)(c) Gasket contact surface mating with metallic, metal-jacketed, spiral-wound, metal-graphite, and spiral-wound metal-asbestos gaskets, except for surface defects accepted by Step 1.c.(1)(a), must have a finish of rhr 125 or smoother.
- 1.c.(1)(d) Gasket contact surface mating with flat gaskets, except for surface defects accepted by Step 1.c.(1)(a), must have a finish of rhr 500 or smoother.



TECHNICAL REFERENCE DATA

(a) Submarine Fastening Criteria

NAVSEA S9505-AM-GYD-010

1.e. Threads and self-locking fasteners:

- NOTE 23: Removal of threaded fasteners or thread inserts only to determine acceptability of threads is not required.
- NOTE 24: Reinstallation of studs with anaerobic sealant must be in accordance with recommended vendor procedures or approved local overhaul facility procedures.
- NOTE 25: If necessary, threads should be cleaned before applying these acceptance criteria.
- NOTE 26: Thread requirements apply to the load bearing portions of the fastener only. Defects are acceptable on the free end of the fastener only if they cannot cause damage to the engaging threads.
- NOTE 27: Steam turbine fasteners with original copper plating disturbed need not be replated or replaced, provided anti-galling (compound) lubricant per CID A-A-59004 (Molykote P-37 paste) is used. If replacement fasteners are necessary, they need not be copper plated, provided anti-galling (compound) lubricant per CID A-A-59004 (Molykote P-37 paste) is used.
- NOTE 28: Reference (a) should be used for repair, installation, and replacement of threads and fasteners.

1.e.(1) Type I threads and self-locking fasteners:

- 1.e.(1)(a) Cracks are not acceptable.
- 1.e.(1)(b) Broken, chipped, or missing threads are not acceptable.
- 1.e.(1)(c) Isolated minor defects are allowed. An isolated minor defect is a single nick, gouge, or flattened thread (after removal of sharp edges and raised metal), that has a depth greater than 1/64" but less than 1/2 the thread height (depth) and a width less than the thread spacing (pitch). Defects less than 1/64" may be ignored.
- 1.e.(1)(d) An isolated minor defect that exceeds the width criteria is acceptable when the total length of the defect does not exceed 15 percent of 1 thread length in any 1 complete thread. One complete thread or 1 thread length is defined as 1 complete rotation (360° on a single thread), starting at a point along the thread.

- 1.e.(1)(e) Any combination of minor defects is acceptable when the total combined length of the defects does not exceed 15 percent of 1 thread length on 1 complete thread.
 - 1.e.(1)(f) Clearance fit threads must engage by hand.
 - 1.e.(1)(g) The locking insert on externally threaded male fasteners must be replaced at each reuse; however, the locking portion may be reused if the element generates a breakaway torque of at least 25 percent of the value listed for the appropriate size in Reference (a) Table 3-4. If logistic problems prohibit compliance with these requirements, threaded male fasteners may be reused by applying an anaerobic thread locking compound chosen to allow future removal (such as MIL-S-22473 Grade C or CVV). Self-locking nuts must meet the requirements of Reference (a) Paragraph 3-41.e(1).
- 1.e.(2) Type II threads and self-locking fasteners:
- 1.e.(2)(a) Thread defects that do not go beyond the thread root diameter are acceptable provided total surface of all engaged threads is not reduced more than 10 percent as estimated visually.
 - 1.e.(2)(b) Clearance fit threads must engage by hand.
 - 1.e.(2)(c) The locking insert on externally threaded male fasteners must be replaced at each reuse; however, the locking portion may be reused if the element generates a breakaway torque of at least 25 percent of the value listed for the appropriate size in Reference (a) Table 3-4. If logistic problems prohibit compliance with these requirements, threaded male fasteners may be reused by applying an anaerobic thread locking compound chosen to allow future removal (such as MIL-S-22473 Grade C or CVV). Self-locking nuts must meet the requirements of Reference (a) Paragraph 3-41.e(1).
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1.g. Wall thickness:

NOTE 33: Wall thickness acceptance criteria applies to all wetted pressure boundary surfaces. Thickness measurements are not required in those areas where visual inspection verifies that no erosion or corrosion has occurred.

- 1.g.(3) Wall thickness criteria (steam and feed system components):
- 1.g.(3)(a) Wall thickness reduction is acceptable to a maximum of 1/32" (or 10 percent of original minimum wall, whichever is less) below the minimum drawing thickness (considering original manufacturing tolerances if known). The surface defects can cover 100 percent of the exposed surface.

- 1.g.(3)(b) Additional surface defects or small pockets (diameter not to exceed twice the nominal wall thickness) over the whole exposed area which will result in additional local wall reduction are acceptable if the following stipulations are complied with:
 - 1.g.(3)(b)1 Defect area is not more than 10 percent of the exposed area.
 - 1.g.(3)(b)2 Depth of the defects is not more than 10 percent of the minimum drawing thickness to a maximum of 1/16" with a minimum average distance between defects of 1/4".

- 1.g.(5) Wall thickness criteria (condensate or other low-pressure non-seawater components):
 - 1.g.(5)(a) Wall thickness reduction is acceptable to a maximum of 1/16" (or 20 percent of the original minimum wall, whichever is less) below the minimum drawing thickness (considering original manufacturing tolerances if known). The surface defects can cover 100 percent of the exposed surface.
 - 1.g.(5)(b) Additional surface defects or small pockets (diameter not to exceed twice the nominal wall thickness) over the whole exposed area which will result in additional local wall reduction are acceptable if the following stipulations are complied with:
 - 1.g.(5)(b)1 Defect area is not more than 20 percent of the exposed area.
 - 1.g.(5)(b)2 Depth of the defects is not more than 20 percent of the minimum drawing thickness to a maximum of 1/8" with a minimum average distance between defects of 1/8".